U.S. FISH AND WILDLIFE SERVICE SPECIES
ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: Pleurocera foremani

COMMON NAME: rough hornsnail

LEAD REGION: 4

INFORMATION CURRENT AS OF: March 2006

STATUS/ACTION

___ Species assessment - determined we do not have sufficient information on file to support a proposal to list the species and, therefore, it was not elevated to Candidate status

__X_ New candidate

___ Continuing candidate

___ Non-petitioned

___ Petitioned - Date petition received:

_ 90-day positive - FR date:

_ 12-month warranted but precluded - FR date:

_ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)?

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions?

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded.

___ Listing priority change

Former LP: ___

New LP: ___

Date when the species first became a Candidate (as currently defined):

___ Candidate removal: Former LPN: ___

___ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

____U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.

___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.
___ N – Taxon does not meet the Act's definition of "species."
___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Snails - Pleuroceridae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Alabama

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Shelby/Elmore Counties, Alabama

LAND OWNERSHIP:
The waters where the rough hornsnail currently occurs are under State jurisdiction. Adjacent riparian lands are in private ownership.

LEAD REGION CONTACT: Rick Gooch 404/679-7124, richard_gooch@fws.gov

LEAD FIELD OFFICE CONTACT: Jackson, Mississippi Field Office, Paul Hartfield, 601/321-1125, paul_hartfield@fws.gov

BIOLOGICAL INFORMATION

Species Description
The rough hornsnail shell is elongated, pyramidal in shape, and thick. It has as many as nine whorls which are colored yellowish brown. The aperture (shell opening) is elongated, angular, channeled at the base, and usually colored white inside. The most distinctive feature that separates it from other hornsnails are prominent nodules or tubercles on the lower whorls above the aperture. These tubercles, along with the size and shape of the shell, distinguish the species from all other pleurocerid snails (i.e., Elimia spp., Leptoxis spp., Pleurocera spp.) in the Mobile River Basin (P. Hartfield, U.S. Fish and Wildlife Service, pers. obsv.).

Taxonomy
The rough hornsnail belongs to the aquatic snail family of Pleuroceridae. The species was described by Lea (1843) as Melania foremanii (=foremani), and later placed in the genus Pleurocera by Tryon (1873), who noted that P. foremani closely resembled other species of that genus. Goodrich (1935) reported a variation of a species of Pleurocera occurred in the Cahaba River that resembled foremani, but later identified that variant as a "mutation" or form of P. vestitum (Goodrich 1941). This variant, however, is no longer extant in the Cahaba River (Sides 2005). Goodrich (1944) considered that Coosa River P. foremani might also be eventually found to be simply a variant of Pleurocera prasinatum, another more widely distributed species in the Coosa River.

In a recent dissertation on the systematics of Mobile River Basin Pleurocera, the rough

hornsnail was found to be both morphologically and genetically distinct from other species in the genus (Sides 2005). This analysis also found that the rough hornsnail was genetically more closely allied to a co-occurring species in the genus Elimia, and concluded that it should be recognized as Elimia foremani (Sides 2005). Although this taxonomic change has not yet been formally reviewed and published, the Sides (2005) study provides strong evidence that supports recognition of the rough hornsnail (Pleurocera foremani) as a valid taxon that meets the Endangered Species Act definition of a species.

Habitat/Life History

The rough hornsnail primarily occurs on gravel, cobble, and bedrock in streams with moderate currents. It has been collected at depths of 1 meter (m) (3.25 feet (ft)) to 3 m (9.75 ft). The species appears to tolerate low to moderate levels of silt deposition (Sides 2005). Little is known regarding the life history characteristics of this species.

Historical Range/Distribution

The rough hornsnail is endemic to the Coosa River system in Alabama. Goodrich (1944) described the historical range as the Coosa River downstream of the Etowah River, and at the mouths of a few tributaries. The Etowah River enters the Coosa in Floyd County, Georgia, however, there are no known museum or site specific records of rough hornsnail that validate its range into the State of Georgia (Paul Johnson, Alabama Department of Natural Resources (ADCNR) in litt. 2005). Historical museum records of rough hornsnail extend from Etowah County downstream to Elmore County, Alabama, a distance of approximately 200 river miles (xxx km) (Florida Museum of Natural History (FMNH) Invertebrate Zoology Master Database). There are also historical museum records of this species from nine Coosa River tributaries in Alabama (FMNH Invertebrate Zoology Master Database).

Current Range/Distribution

The rough hornsnail is currently known to occur at two locations: lower Yellowleaf Creek (a tributary of the Coosa River), Shelby County, Alabama; and the lower Coosa River below Wetumpka Shoals, Elmore County, Alabama (Sides 2005). Yellowleaf Creek is a moderately sized stream, and rough hornsnail have been collected from about a 50 meter (m) (50 yard (yd)) length of the stream. The lower Coosa River is a large river channel, and rough hornsnail have been found in an area of about 100 m^2 (100 yd^2) (P. Hartfield pers. obsv.). Searches of unimpounded reaches of the Coosa River and the lower portions of tributaries to the Coosa have failed to locate the species at other localities (Bogan and Pierson 1993; J. Garner, ADCNR, pers. comm., 2005). The two populations are separated by three impoundments and about 70 miles of impounded channel habitat.

Population Estimates/Status

Rough hornsnails probably number in the hundreds at the two sites known to be currently occupied (P. Hartfield pers. obsv.), however, no quantitative population estimates have been made.

THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

The historical habitats of the rough hornsnail have been extensively modified by six large dams constructed for hydropower production. Dams eliminate or reduce currents within impounded areas, allowing sediments to accumulate on inundated channel habitats. Impounded waters also experience changes in water chemistry (McAllister et al. 2000, Watters 1999) which could affect survival or reproduction of pleurocerid snails (Bogan et al. 1995, Lydeard and Mayden 1995, Neves et al. 1997). Only short reaches of flowing channel habitats exist between the dam tailwaters and impounded waters below. Hydropower regimes may limit the species ability to survive in these areas. Due to the effects of impoundment, the rough hornsnail has been eliminated from 99 % of its historical range in the Coosa River drainage.

Rough hornsnails currently survive at localized sites in Yellowleaf Creek and in the Coosa River below Wetumpka Shoals. The primary threat to snails in these areas is water quality and habitat deterioration that may result from point source discharges and/or land surface runoff (nonpoint pollution). These actions may cause nutrification, decreased dissolved oxygen concentration, increased acidity and conductivity, and other changes in water chemistry that can seriously impact aquatic snails, including the rough hornsnail.

Nonpoint source pollution from land surface runoff originates from virtually all land use activities, and includes sediments; fertilizer, herbicide, and pesticide residues; animal or human wastes; septic tank leakage and gray water discharge; and oils and greases (Alabama Department of Environmental Management (ADEM) 1996). Land uses in the vicinity of rough hornsnail populations include pasture, row crops, timber production, and urban and rural communities.

Excessive sediments are believed to impact riverine snails requiring clean, hard shoal stream and river bottoms, by making the habitat unsuitable for feeding or reproduction. Similar impacts resulting from sediments have been noted for many other components of aquatic communities. For example, sediments have been shown to abrade and/or suffocate periphyton (organisms attached to underwater surfaces, upon which snails may feed); affect respiration, growth, reproductive success, and behavior of aquatic insects and mussels; and affect fish growth, survival, and reproduction (Waters 1995). Potential sediment sources within a watershed include virtually all activities that disturb the land surface, and all localities currently occupied by these snails are affected to varying degrees by sedimentation.

Land surface runoff also contributes nutrients to rivers and streams. Excessive nutrient input (e.g. from fertilizers, sewage waste, animal feces) can result in periodic low dissolved oxygen levels that are detrimental to aquatic species (Hynes 1970). Nutrient and sediment pollution may have synergistic effects (a condition in which the toxic effect of two or more pollutants is much greater than the sum of the effects of the pollutants

when operating individually) on freshwater snails and their habitats, as has been suggested for aquatic insects (Waters 1995).

Both Yellowleaf Creek and the eastern watershed of the lower Coosa have been designated as High Priority Watersheds by the Alabama Clean Water Partnership (2005), due to a lack of data and the high potential of nonpoint source pollution in these drainages, primarily due to human growth rates and urbanization impacts.

B. Overutilization for commercial, recreational, scientific, or educational purposes.
The rough hornsnail has no commercial value. Overutilization has not been a problem.

C. Disease or predation.
Disease is not currently known to be a factor in the decline of the rough hornsnail. Aquatic snails are consumed by various vertebrate predators, including fishes, mammals, and possibly birds. Predation by naturally occurring predators is a normal aspect of the population dynamics of a species and is not considered a threat to the rough hornsnail. However, slower water flows, greater depths, and other environmental factors may have led to higher numbers of native mollusk-eating fish, such as freshwater drum. In addition, the potential now exists for the black carp (Mylopharyngodon piceus), a mollusk-eating Asian fish recently introduced into the waters of the United States, to eventually enter the Mobile River Basin. Therefore, predation may constitute a future threat to surviving rough hornsnails.

D. The inadequacy of existing regulatory mechanisms.
There is no information on the sensitivity of the rough hornsnail to common industrial and municipal pollutants. Current State and Federal regulations regarding such discharges are assumed to be protective; however, this snail species may be more susceptible to some pollutants than test organisms currently used in bioassays. A lack of adequate research and data may prevent existing authorities, such as the Clean Water Act, administered by the Environmental Protection Agency and the Army Corps of Engineers, from being fully utilized.

Alabama Department of Environmental Management (ADEM) has designated the water use classification for Yellowleaf Creek as “Swimming” (S) and “Fish and Wildlife” (F&W). The lower Coosa River below Wetumpka is currently designated as F&W by ADEM, however adjacent tributaries are also classified as S. The S classification establishes water quality standards to be protective of human contact with the water. The F&W classification establishes minimum water quality standards believed necessary to protect existing species and their uses within the designated area. The ADEM seeks to maintain water-use classifications through issuance of National Pollutant Discharge Elimination System (NPDES) permits to industries, municipalities and others, that set maximum limits on certain pollutants or pollutant parameters. There are currently more than 20 permitted discharges into Yellowleaf Creek (Alabama Clean Water Partnership 2005). Although both Yellowleaf Creek and the eastern watershed of the lower Coosa are currently believed to support their designated uses, they have been designated as High Priority Watersheds by the Alabama Clean Water Partnership (2005), due to a lack of

data and the high potential of nonpoint source pollution in these drainages, primarily due to human growth rates and urbanization impacts. The headwaters of Yellowleaf Creek are about 3 miles southeast of the metropolitan area surrounding Birmingham, and the watershed is highly dissected by county roads. The lower Coosa River is about 10 miles north of the Montgomery greater metropolitan area, and is accessible by 4-lane highway. Both general areas are experiencing growth as bedroom communities to their respective adjacent metropolitan areas.

The rough hornsnail is identified as "critically imperiled" (rank=G1) by NatureServe, which maintains a national database on the status of species based on data from the State Natural Heritage programs and other affiliates. The rough hornsnail has also been identified by the Alabama Department of Conservation and Natural Resources (ADCNR) as a "Priority 1" species of highest conservation concern in Alabama Wildlife (Mirarchi et al. 2004), and in Alabama's Comprehensive Wildlife Conservation Strategy (ADCNR 2005). This classification identifies species that are critically imperiled and at risk of extinction or extirpation. However, neither the NatureServe classification or the ADCNR classification conveys any legal protection. Alabama's "Strategy" document includes a description of priority conservation actions (e.g. support for implementation of more natural flow regimes and full compliance with water quality standards at Coosa River dams) and related performance measures, but there is no requirement that such actions be funded or implemented. Lacking State or Federal protection, the rough hornsnail is not currently given any special consideration under other environmental laws when project impacts are reviewed.

E. Other natural or manmade factors affecting its continued existence.

The rough hornsnail's extremely restricted distribution leaves it highly vulnerable to local landuse activities as well as to random natural or manmade catastrophic events such as droughts or chemical spills. Only two, small and localized populations of rough hornsnail are currently known to exist. Genetic flow between the two populations is prevented by their isolation by three major impoundments. Therefore, inbreeding and reduced genetic diversity may also be a threat (Avise and Hambrick 1996). There is currently little information on genetics of the Yellowleaf Creek population, and no information on the Coosa River population.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

The Service initiated and supported taxonomic and genetic studies which have identified the rough hornsnail as a valid taxonomic entity (Sides 2005). The State of Alabama has established a propagation facility for imperiled mussels and snails, and has worked with the Service to prepare and implement a Plan for Controlled Propagation, Augmentation, and Reintroduction for freshwater mollusks of the Mobile Basin (U.S. Fish and Wildlife Service 2003). Life history and propagation studies are planned. The Alabama Clean Water Partnership (2005) has developed a management plan for the lower Coosa River that recognizes the presence of the species, and that will improve and protect water quality in the areas where the rough hornsnail currently survives, however, the plan has not been fully implemented.

The Alabama Comprehensive Wildlife Conservation Strategy identifies conservation and management needs for the rough hornsnail and its habitat.

SUMMARY OF THREATS: Dams and their impounded waters have rendered more than 99% of rough hornsnail historical habitat unsuitable for its survival, and significantly curtailed the species range. Only two localized populations are known to exist, and they are isolated from each other by three major impoundments. Because of limited numbers and range, both populations of rough hornsnail are vulnerable to natural or human induced changes to stream and river habitats. Both populations occur in areas experiencing rapid human growth and development, and are particularly vulnerable to nonpoint source pollution.

RECOMMENDED CONSERVATION MEASURES
Alabama's Comprehensive Wildlife Conservation Strategy (ADCNR 2005) and the Lower Coosa River Basin Management Plan (The Alabama Clean Water Partnership 2005) should be fully implemented. A captive population should be established for study and to produce propagules for reintroduction into appropriate habitats. Life history and toxicity studies should be conducted. The surviving populations and reintroduced populations should be routinely monitored.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2*
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude: The rough hornsnail has experienced significant curtailment of habitat and range. The species has disappeared from more than 99% of its historical range. There are only two small and localized populations of rough hornsnail known to survive, and they are isolated from each other and potentially suitable habitats by multiple major

impoundments.

Imminence: Threats to rough hornsnail are imminent. The two surviving populations are extremely small, localized, and vulnerable to extinction from natural random events and human-induced events. Their small numbers and limited distribution make them vulnerable to any land-use activities or natural events that affect water and habitat quality. Both populations are in areas currently experiencing high human growth and development.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No, at this time, we do not believe that the current immediacy or magnitude of identified threats to the species warrant the need for emergency listing as outlined in section 4 of the Endangered Species Act. The Service will continue to assess the status and trends of the species and its habitat and may adjust this conclusion using the best scientific and commercial information as it becomes available.

DESCRIPTION OF MONITORING: Species experts and appropriate individuals with State and Federal agencies have been contacted and asked to provide data on the rough hornsnail. These include Stan Cook, Dr. Paul Johnson, and Jeff Garner, ADCNR; and Jeff Powell, USFWS.

COORDINATION WITH STATES
Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment:
A draft Species Assessment for the rough hornsnail was sent to the States of Alabama and Georgia for review and comment. Both States responded with minor editorial comments.

Indicate which State(s) did not provide any information or comments: N/A

LITERATURE CITED

Peer-reviewed original research based on data:

Bogan, A.E., J.M. Pierson, and P. Hartfield. 1995. Decline in the freshwater gastropod fauna in the Mobile Bay Basin. In: E.T. LaRoe, G.S. Farris, C.E. Puckett, P.D. Doran, M.J. Mac, Eds. Our living Resources, a report to the Nation on the distribution, abundance and health of U.S. plants, animals and ecosystems. U.S. Department of Interior, National Biological Survey, Washington, D.C. pp. 249-252.

Goodrich, C. 1935. Studies of the gastropod family Pleuroceridae - V. Occasional Papers of the Museum of Zoology of the University of Michigan 318: 1-12.

Goodrich, C. 1941. Pleuroceridae of the small streams of the Alabama River system. Occasional Papers of the Museum of Zoology, University of Michigan (427):1-10.

Goodrich, C. 1944. Pleuroceridae of the Coosa River Basin. The Nautilus 58(2): 40-48.

Lea, I. 1843. Change of several specific names of Melaniae, because of preoccupation. Proceedings of the American Philosophical Society 2: 242.

Lydeard, C. and R.L. Mayden. 1995. A diverse and endangered aquatic ecosystem of the southeast United States. Conservation Biology 9(4): 800-805.

Tryon, G.W. 1873. Land and fresh-water shells of North America, Part IV, Streptomatidae (American Melanians). Smithsonian Miscellaneous Collection 253(iv): 1-435.

Peer reviewed secondary research derived:

Avise, J.C. and J.L. Hambrick, eds. 1996. Conservation genetics: case histories from nature. Chapman and Hall, New York.

Hynes, H.B.N. 1970. The Ecology of Running Waters. University of Toronto Press, Toronto.

McAllister, D., J. Craig, N. Davidson, D. Murray, and M. Seddon. Biodiversity impacts of large dams. In: G. Berkamp, M. McCartney, P. Dugan, J. McNeely and M. Acreman. 2000. Dams, Ecosystem Functions and Environmental Restoration. Thematic Review 11.1. World Commission on Dams, Cape Town, SA.

Mirarchi, R.E., J.T. Garner, M.F. Mettee, P.E. O'Neil, eds. 2004. Alabama wildlife. Volume 2. Imperiled aquatic mollusks and fishes. The University of Alabama Press, Tuscaloosa, AL. 255 pp.

Neves, R.J., A.E. Bogan, J.D. Williams, S.A. Ahlstedt, and P. Hartfield. 1997. Status of aquatic mollusks in the southeastern United States: a downward spiral of diversity. In: G. W. Benz and D.E. Collins (eds), Aquatic Fauna in Peril: the Southeastern Perspective. Southeast Aquatic Research Institute, Special Publication 1. Pp 43-86.

Waters, Thomas F. 1995. Sediment in streams: sources, biological effects and control. American Fisheries Society Monograph 7.

Watters, G.T. 1999. Freshwater mussels and water quality: a review of the effects of

hydrologic and instream habitat alterations. Proceedings of the First Freshwater Mollusk Conservation Society Symposium: 261-274

Grey research based on data:

Alabama Clean Water Partnership. 2005. Lower Coosa River Basin Management Plan. Delaney Consultant Services, Inc. Montgomery, AL.

Alabama Department of Environmental Management (ADEM). 1996. Water quality report to Congress for calender years 1994 and 1995. Montgomery, Alabama. 144 pp.

Alabama Department of Environmental Management (ADEM). 2005. Alabama's Comprehensive Wildlife Conservation Strategy. Pp. 141-148.

Bogan, A.E. and J.M. Pierson. 1993. Survey of the aquatic gastropods of the Cahaba River basin, Alabama: 1992. Final report submitted to the Alabama Natural Heritage Program, ALDCNR State Lands Division. Montgomery, Alabama.

Grey literature based on literature analysis:

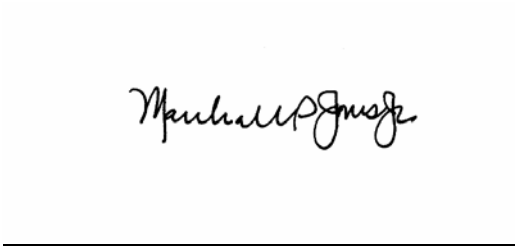
U.S. Fish and Wildlife Service. 2003. Freshwater mussels and snails of the Mobile River Basin: plan for controlled propagation, augmentation, and reintroduction. Ecological Services. Jackson, MS. 17 pp.

Other:

Sides, J.D. 2005. The systematics of freshwater snails of the genus Pleurocera (Gastropoda: Pleuroceridae) from the Mobile River Basin. Dissertation. The University of Alabama, Tuscaloosa, AL. 207 pp.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: /s/ Jeffrey M. Fleming 3/6/2006
Acting Regional Director, Fish and Wildlife Service Date



Concur: _____ August 23, 2006
Acting Director, Fish and Wildlife Service Date

Do Not Concur: _____ _____
Director, Fish and Wildlife Service Date

Date of annual review:
Conducted by: